# U.S. GMDSS MODEL COURSE

| Detailed Learning Objectives | A<br>IMO REFERENCE | B<br>TEXTBOOK | C<br>TEACHING AIDS |
|---|---|---|---|
| **1 INTRODUCTION**<br><br>**1.1 The Course**<br>**.1** States the background and purpose of GMDSS and definitions of sea areas<br>• A1, A2, A3 and A4.<br>• states dates of implementation.<br>• states details of carriage requirements<br>• states details of communications equipment in uses and sea areas.<br>• lists methods of distress, urgency safety alerting.<br><br>**.2** States certification requirements.<br><br>**2 PRINCIPLES OF COMMUNICATIONS**<br><br>**2.1 Principles and basic features of the maritime mobile service.**<br>**. 1** States the types of communications in the maritime mobile service and ITU Regs.<br>• Distress, urgency and safety communications<br>• Public correspondence<br>• Port operations service<br>• Ship movement service<br>• Intership communication<br>• On-board communication<br><br>**. 2** Types of station in the maritime mobile service.<br>• Ship stations<br>• Coast stations<br>• Pilot stations, Port stations etc.<br>• Aircraft stations<br>• Rescue coordinating centers (MRCC)<br><br>**. 3** Shows an elementary knowledge of frequencies and frequency bands.<br>• the concept of frequency<br>• the equivalence between frequency and wavelength<br>• states the units of measurement, Hz, kHz, MHz and GHz<br>• states the subdivision of the radio frequency spectrum<br>• medium frequency (MF), high frequency (HF), very high frequency (VHF), ultra high frequency (UHF), super high frequency(SHF)<br><br>**. 4** Characteristics of radio propagation.<br>• describes the theory of propagation<br>• describes the details of the ionosphere<br>• states methods of propagation by low frequency, medium frequency, high frequency and very high frequency<br>• describes action of ground waves, sky waves and space waves<br>• describes purpose and action of automatic gain control & squelch<br>• describes maximum usable frequency<br>• describes optimum traffic frequency and calculation<br>• describes frequencies used for satellite communications | | | |

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| **. 5** Describes different types of modulation and emission.<br>• lists classes of emission and describes (AM,FM,SSB,FSK,CW)<br>• describes carrier and bandwidth of emission<br>• lists official designations of emission (e.g. F1B, H3E, J3E, F3E, A3E, A1A etc.)<br>• states the uses and restrictions for different emissions according to frequency and purpose in the maritime bands<br><br>**. 6** Lists frequency allocations in the maritime mobile bands.<br>• describes the usage of bands and frequencies in the maritime mobile service<br>• describes the concept of simplex, duplex, half duplex, paired frequencies and ITU channels<br>• describes the correct usage of frequency, frequency band and modes of emission for maritime communications as required by the Radio Regulations<br>• lists frequencies for Distress, urgency and safety communications for GMDSS purposes as required by the Radio Regulations<br>• lists frequencies for routine call and reply<br><br>**2.2 Principles and features of the maritime mobile satellite service.**<br><br>**. 1** Describes and demonstrates the basic operation of Satellite communications.<br>• describes the Inmarsat system<br>• lists the services available on Inmarsat A, Inmarsat B, Inmarsat M, Inmarsat C, Inmarsat E and other satellite systems<br>• describes the function of Enhanced Group Call system (EGC)<br>• describes Distress, Urgency**,** Safety**,** and routine communications by satellite<br><br>**. 2** Lists types of station in the satellite service.<br>• coast earth stations and their functions (CES)OR (LES***)***<br>• network coordination station and their function (NCS)<br>• ship earth station and their operation (SES) & (MES)<br><br>**2.3 Global Maritime Distress and Safety System (GMDSS)**<br><br>**. 1.** States the functional requirements of ship stations<br>• States functional requirements of each piece of equipment (operator level)<br>• states definitions of coverage and sea areas<br>• states details of carriage requirements<br>• describes maritime safety information services (MSI)<br>• states watchkeeping procedures as defined in the Federal Communications Commission's Rules and Regulations (47 CFR PART 80) ***FCC 'S SUGGESTION IS TO GIVE EACH STUDENT A COPY OF THE ITU BLUE BOOK***<br><br>**. 2** Describes sources of power.<br>• describes reserve power supplies, capacity and duration as defined by 47 CFR PART 80 & SOLAS<br>• describes prohibitions on the connection of non GMDSS equipment<br>• Describes Main & Emergency power supplies | | | |

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| **. 3** Describes the requirements and means of ensuring availability of ship station equipment as specified in 47 CFR 80<br>• describe equipment duplication<br>• describe on board maintenance strategies and requirements defined in the Federal Communications Commission's Rules and Regulations for GMDSS (47 CFR 80***)***<br>• describes shore based maintenance<br>• | | | |
| **. 4** Describes primary and secondary means of alerting. | | | |
| **. 5** Describes details of ship radio station licenses and radio safety certificates.<br>• lists details shown on the ship license<br>• describes requirements for radio safety certificates | | | |
| **. 6** Describes mobile stations Logbook requirement.<br>• lists details of logbook daily entries<br>• lists details of all other periodic entries such as equipment tests as required by the FCC Rules and Regulations (47 CFR 80***)*** | | | |
| **3 GMDSS Communication Systems**. | | | |
| **3.1 Purpose and use of Digital Selective Calling (DSC) facilities.** | | | |
| **. 1** Describes and demonstrates basic functions of DSC.<br>• lists DSC message types<br>• describes DSC call format<br>• describes frequency selection in call format<br>• describes call acknowledgment<br>• describes call relay process | | | |
| **. 2** Describes and demonstrates call format specifier and types of call.<br>• distress call<br>• all ships call<br>• call to individual station<br>• geographic area call<br>• group call<br>• call to individual station using automatic service | | | |
| **. 3** Describes the Maritime Mobile Service Identity (MMSI) and the selection of MMSI for calling.<br>• describes the MMSI format and its relation to the Imarsat MESIN<br>• describes Maritime Identification Digits (MID)<br>• describes ship station identification number<br>• describes group calling numbers<br>• describes coast station numbers<br>• Demonstrates ability to use publication to find MMSI of specific station | | | |
| **. 4** Lists priority and categories of calls.<br>• describes distress call<br>• describes urgency call<br>• describes safety call<br>• describes ship business call<br>• describes routine call | | | |

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| **. 5** Describes and demonstrates call telecommand and traffic information.<br>• distress alerts<br>• distress categories<br>• distress coordinates<br>• time and validity of distress coordinates<br>• other calls and message<br>• describes working frequency and channel selection<br><br>**. 6** Describes DSC facilities and usage.<br>• describes channel 70 operation<br>• describes the HF<br>• describes the MF<br>• describes manual selection of modes for further communication<br>• describes methods of DSC data entry<br>• updating vessel position<br>• entering preset messages<br>• reviewing received messages<br>• DSC watchkeeping functions and controls<br><br>**3.2 General principles of narrow band direct printing (NBDP)**<br><br>**. 1** Describes and demonstrates NBDP systems.<br>• automatic systems<br>• semi-automatic systems<br>• manual systems<br>• acknowledge/request (ARQ) mode<br>• forward error correction (FEC) mode<br>• information sending/receiving<br>• shore and ship station procedures<br>• selcal numbers for ship and coast stations<br>• answerback procedures<br>• controls and indicators<br>• keyboard operation<br><br>**3.3 Knowledge and use of Inmarsat systems**<br><br>**. 1** Describes Inmarsat satellite systems and network<br><br>**. 2** Describes Inmarsat A, B and C ship earth station (SES)<br>• methods of satellite acquisition<br>• telex services<br>• telephone services<br>• data and facsimile communications<br><br>**. 3** Describes and demonstrates Inmarsat Enhanced Group Calling Service<br>• safetynet and fleetnet facilities<br>• programming a SES for EGC and safetynet reception<br>• updating ships position manually and automatically<br>• selecting mode for EGC reception | | | |

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| **. 4** Describes and demonstrates an Inmarsat C ship earth station.<br>• components of an Inmarsat C SES<br>• entering/updating ships position<br>• usage of an Inmarsat C SES<br>• sending and receiving text messages<br><br>**3.4 Knowledge and practical use of ship station equipment.**<br><br>**. 1** Describes and demonstrates the purpose and use of watchkeeping receivers.<br>• the controls and usage of 2182 kHz watch receiver<br>• the controls and usage of VHF DSC watch receiver<br>• the controls and usage of MF/HF DSC watch receiver<br><br>**. 2** Describes the usage and functions of the VHF installation.<br>• usage of controls<br>• selection of channels<br>• DSC facilities<br><br>**. 3** Describes and demonstrates the usage and functions of the MF/HF installation.<br>• use and selection of frequencies<br>• use and function of controls<br>• connection of power<br>• selecting RX frequency<br>• selecting TX frequency<br>• selecting ITU channel number<br>• tuning the transmitter<br>• selecting class of emission<br>• using clarifier or RX fine tuning<br>• controlling RF gain<br>• using automatic gain control (AGC)<br>• using 2182 kHz instant selector<br>• testing the alarm generator<br>• using the alarm generator<br>• selection of TX power level<br><br>**. 4** Describes and demonstrates survival craft radio equipment.<br>• portable two-way VHF transceivers<br>• emergency position indicating radio beacons (EPIRB)<br><br>**. 5** Describes basic antenna systems.<br>• isolators<br>• VHF whip antennas<br>• MF/HF whip antennas<br>• MF/HF wire antennas<br>• construction of an emergency antenna<br>• satellite antennas | | | |

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| **. 6** Describes and demonstrates battery storage systems<br>• different types of batteries<br>• characteristics of different types<br>• charging of batteries<br>• battery charging methods<br>• maintenance and monitoring of batteries<br><br>**3.5 Fault Location and rectification on marine electronic equipment.**<br><br>**. 1** Demonstrates proficiency in basic fault diagnosis<br>• use of manufacturers documentation to locate faults<br>• use of built in test facilities<br>• replacement of fuses and indicator lamps<br>• basic knowledge of location of major components<br><br>**4 OTHER GMDSS EQUIPMENT**<br><br>**4.1 Emergency Position Indicating Radio Beacons (EPIRBs)**<br><br>**. 1** Describes Cospas Sarsat satellite system and EPIRBs<br>• basic operation of Cospas Sarsat satellite system<br>• describes operation of a 406 MHz EPIRB<br>• information content of a distress alert<br>• registration and coding of an EPIRB<br>• Describes or demonstrates manual operation<br>• Describes or demonstrates float free function<br>• Describes or demonstrates routine maintenance<br>• Testing requirement and test operation<br>• Checking battery expiration date<br>• Cleaning/checking float free mechanism<br><br>**. 2** Describes Inmarsat E EPIRB system<br>• basic operation of the system on 1.6 GHz<br>• information content of a distress alert<br>• registration and coding<br>• manual operation<br>• float free function<br>• routine maintenance<br>• testing requirement and test operation<br>• checking battery expiration date<br>• cleaning/checking float free mechanism<br><br>**. 3 Describes & demonstrates precautions taken to avoid false alerts**<br>• handling<br>• transportation and shipping precautions off the vessel<br>• proper cancellation of an inadvertant activation<br><br>**. 4 Describes additional EPIRB features**<br>• 121.5 MHz SAR homing function<br>• strobe lights | | | |

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| **4.2 Search and Rescue Transponder (SART)** | | | |
| **. 1 Describes the operation of SART**<br>• list main technical details relevant to operation<br>• operating height and range and proper deployment<br>• effect of radar reflector<br>• indication on SAR vessels radar screen<br>• testing of SART<br>• routine maintenance<br>• checking battery expiration date<br>• Describe required radar adjustments necessary to receive SART | | | |
| **4.3 Maritime Safety Information (MSI) services** | | | |
| **. 1 Describes services available and methods of transmission**<br>• MSI by satellite<br>• MSI by MF and HF<br>• MSI by HF telex<br>• The NAVTEX system<br>  • operation of the NAVTEX system receiver<br>  • frequencies<br>  • coverage areas of transmissions<br>  • range of transmitters<br>  • message format and identification<br>  • selection of transmitters<br>  • selection of message types<br>  • message types which cannot be rejected<br>  • use of controls and changing paper | | | |
| **5 DISTRESS ALERTING** | | | |
| **5.1 Search and Rescue Operation (SAR)** | | | |
| **. 1** Describes the role of Rescue coordinating Centers (RCC)<br>• knowledge of SAR systems worldwide<br>• knowledge of SAR system interconnection | | | |
| **. 2** Describes the role of SAR resources<br>• merchant ship search and rescue manual (MERSAR) | | | |
| **. 3** Describes the role & method of use of ship reporting systems for example Amver, Ausrep, Jasrep system, etc.<br>• importance of participation | | | |

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| **5.2 GMDSS Terrestrial Distress, Urgency Safety Communication procedures**<br><br>**. 1** Describes and demonstrates distress communications and DSC alerts<br>• the definitions of a distress alert<br>• transmission of a distress alert<br>• transmission of a shore to ship distress alert relay<br>• transmission of a distress alert by a station not itself in distress (Distress relay by ship)<br>• receipt and acknowledgment of a DSC distress alert<br>• acknowledgment by radiotelephony<br>• acknowledgment by NBDP<br>• receipt and acknowledgment by a shore station<br>• receipt and acknowledgment by a ship station<br>• preparations for handling distress traffic<br>• distress traffic terminology<br>• on scene communications<br>• related SAR operations<br>•<br>**. 2** Describes & demonstrates Urgency and Safety communications. by DSC<br>• the meaning of urgency and safety communications<br>• procedures for DSC urgency and safety calls<br>• urgency communications<br>• medical transports<br>• safety communications<br><br>**. 3** Describes & demonstrates communications by radiotelephony in distress, urgency and safety situations<br>• the radiotelephone 2182 kHz alarm signal<br>• the distress signal<br>• the distress call<br>• the distress message<br>• acknowledgment of distress message<br>• distress traffic terminology<br>• transmission of a distress message by a station not itself in distress<br>• request for medical advice<br>**. 4** Describes & demonstrates communications by narrowband direct printing in distress, urgency, and safety situations<br>• The distress message<br>• Acknowledgment of distress message<br>• Distress traffic terminology<br>• Transmission of a distress message by a station not itself in distress<br>• Request for Medical advice | | | |

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| **5.3 Satellite distress, urgency and safety communication procedures in the GMDSS**<br><br>**. 1** Describes and demonstrates the Inmarsat A/B ship earth station alerting functions<br>• distress, urgency and safety procedures<br>• methods of initiating alerts<br>• satellite acquisition<br>• telex and telephony distress calls<br>• telex and telephony urgency and safety calls<br>• procedures for preparation of calls<br>• details of Rescue Coordinating Centers (RCCs) associated with Coast Earth Stations (CESs)<br><br>**. 2** Describes and demonstrates Inmarsat C ship earth station alerting functions<br>• distress urgency and safety procedures<br>• methods of initiating an alert<br>• satellite acquisition<br>• sending a distress priority message<br>• describe Inmarsat C safety services<br>• list two digit special access codes and their purpose<br><br>**5.4 Protection of distress frequencies**<br><br>**. 1** Describes methods of preventing false alerts<br><br>**. 2** Describes procedures to minimize the effect of a false alert<br><br>**. 3** Describes testing procedures<br><br>**. 4** States prohibitions on transmissions during distress traffic<br><br>**. 5** States procedures to avoid harmful interference<br><br>**. 6** States regulations regarding unauthorized transmissions<br><br>**. 7** States guard bands protecting distress frequencies<br><br>**6 MISCELLANEOUS SKILLS AND OPERATIONAL PROCEDURES FOR GENERAL COMMUNICATIONS**<br><br>**6.1 Ability to use the English language, written and spoken, for the exchange of communications relevant to the safety of life at sea.**<br><br>**. 1** Explains the use of the International Code of Signals and the IMO Standard Marine Communication Phrases<br><br>**. 2** States recognized standard abbreviations and commonly used service codes.<br><br>**. 3** Describes use of International Phonetic Alphabet | | | |

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| **6.2 Obligatory procedures and practices.** | | | |
| **. 1** Explains the use of obligatory documents and publications<br>• detail methods of updating information | | | |
| **. 2** Describes procedures for radio record keeping<br>• detail log book requirements and mandatory entries | | | |
| **. 3** Demonstrates a knowledge of the regulations and agreements governing the maritime mobile service and the maritime mobile satellite service | | | |
| **6.3 Practical and theoretical knowledge of general communications procedures** | | | |
| **. 1** Describes and demonstrates selection of appropriate communication methods in different situations<br>• use of documentation to determine frequencies etc.<br>• use of propagation tables | | | |
| **. 2** Describes and demonstrates use of documentation to receive traffic lists and meteorological information | | | |
| **. 3** Describes procedures for radio telephone calls<br>• method of calling coast station by radiotelephone<br>• ordering for a manually switched link call<br>• termination of call<br>• special facilities and services available<br>• methods of calling a coast station by DSC<br>• selecting an automatic radiotelephone calling system | | | |
| **. 4** Describes details of a radio telegram<br>• component parts of a radio telegram<br>• the preamble<br>• service instructions<br>• accounting authority (AAIC) or service provider<br>• the address<br>• the text<br>• the signature<br>• types of addressing available<br>• full address<br>• registered address<br>• telex address<br>• counting of words<br>• transmission of telegram by radiotelephony<br>• transmission of telegram by narrowband direct printing | | | |
| **. 5** Describes methods of charging (paying )<br>• International charging systems<br>• Inmarsat charging systems<br>• the AAIC and use of documentation to determine the meaning of landline, coast station and ship station charge<br>• currencies used in charging and conversion<br>• gold francs and special drawing rights etc. | | | |
| **7. ASSESSMENT AND EVALUATION** | | | |

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